

Read pages 10-12 in your text and review your notes. Then, answer the following questions to practice what we have discussed.

1. Classify each of the following statements as either empirical knowledge (E) or theoretical knowledge (T)

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|---|----------|
| a. A yellow solid forms when two solutions are mixed  | <u>E</u> |
| b. When 3 g of calcium chloride are added to water, the temperature of the water rises by 5°C   | <u>E</u> |
| c. For a chemical reaction to occur, molecules must bump into each other under certain conditions.  | <u>T</u> |
| d. Chemical reactions occur faster at higher temperatures because molecules have more kinetic energy; the molecules move faster and collide harder. | <u>T</u> |
| e. Ice melts at 0°C.  | <u>E</u> |
| f. Atoms rearrange themselves during a chemical reaction in order to form new products.   | <u>T</u> |

2. For each of the sentences given below, indicate whether the sentence is an observation or an inference.

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|---|-------------|
| a. The wood does not burn because it is wet | inference   |
| b. The boiling point of methanol is 67.5°C  | observation |
| c. There is 125 mL of water in the flask.   | observation |

3. Qualitative analysis involves making qualitative observations and then interpreting the results to identify a substance. Is qualitative analysis empirical or theoretical? Explain.

*Qualitative analysis is empirical knowledge because it is based upon concrete observations.*

4. For each of the statements below, write a statement of observation and one of inference. For example:

*A forensic investigator probes the possibility of arson at a burned building.*

OBSERVATION: The building is charred and there are ashes around.

INFERENCE: It is possible that the fire was caused by an arsonist.

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|---|--|
| a. A cashier is short of funds at the end of her shift.   |  |
| Observ.: The cashier is short of funds.   |  |
| Inf: The cashier is short of funds because another employee has been taking some money from the cash register |  |
| b. James received a high grade on the last unit test  |  |
| Observ.: James received a high grade on the test  |  |
| Inf.: James received a high grade on the test because he reviewed his notes on a daily basis.                 |  |
| c. The victim described the food as round, flat, and covered in sauce.  |  |
| Observ.: The food is round, flat, and covered in sauce.   |  |
| Inf.: The victim was at a restaurant and was struck by a flying pizza.  |  |
| d. The landlord was upset; the room carpet was covered in fur.  |  |
| Observ.: The landlord was upset and there is fur on the carpet in the room.                                   |  |
| Inf.: The tenant had a several pet cats when the lease indicated that no pets were allowed.                   |  |